



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: LA2621

Title: Fecal Coliform Concentrations in Runoff from Fields with Applied Dairy Manure

Focus Categories: Non Point Pollution, Surface Water

Keywords: fecal coliforms, nonpoint source pollution, dairy

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Congressional District: 6th

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Abstract

A major water quality concern in Louisiana is the concentration of fecal coliform (FC) bacteria in our streams and bayous. In 1988, a health advisory that limited primary contact recreation such as swimming and wading in the Tangipahoa River was issued due to elevated fecal coliform counts. FC counts in the river were often as high as 60 times the standard set for primary contact recreation. The Louisiana Department of Environmental Quality (LDEQ) identified three potential sources of FC contamination to the Tangipahoa River; leakages from faulty home septic systems, effluents from municipal wastewater treatment plants that were not operating properly, and runoff from 'confinement' areas of dairy farms where cattle are held for feeding. Dairy farms in the watershed were required to install waste treatment lagoons and to apply the water from the lagoons to nearby pastures in order to prevent transport of FC to nearby surface waters.

Control of fecal coliform transport from agricultural lands to surface waters is a primary concern for preventing the transmittal of infectious disease through water. Information is needed on the fecal coliform loading to the watershed due to dairy manure application and grazing of cattle. Information on the kinetic parameters and concentration of enteric bacteria in runoff would be of use in determining appropriate manure application loading limits and grazing densities.

Prior studies at the LSU AgCenter Southeast Research Station (SERS) have indicated that FC counts in excess of the standard for primary contact recreation were found in agricultural runoff from pasture after manure application. The FC count in runoff from manure applied pasture exhibited a brief growth period shortly after deposition. However, the research also showed a high rate of 'false positive' FC counts from pasture plots that had not received dairy manure.

The goal of the proposed research is to quantify microbial pollutant transport to surface water from grazed dairy pastures. The specific objectives are as follows: 1) to determine the FC and E. coli concentration in

surface runoff after simulated rainfall from pasture plots that have received application of dairy manure by one of two methods as compared to pasture plots that have not received manure application,; 2) to determine the extent of FC and E. coli regrowth after repeated manure applications, and 3) to determine the relationship between counts of FC and E. coli obtained by a standard method (Membrane Filtration) and those obtained by the IDEXX QuantiTray method.

The research will be conducted at the Southeast Research Station in Franklinton, LA. Nine 1.5 m x 2.0 m pasture plots will be constructed. Three plots will receive dairy manure applied as intact deposits, three plots will receive dairy manure distributed evenly over the area of the plot, and three plots will serve as controls, in that inorganic fertilizer will be applied to simulate the nutrients deposited by grazing animals without deposition of fecal microorganisms.

Surface water will be collected after simulated rainfall applied 1, 3, 7 and 14 days after manure application. The series of rainfall simulations will be repeated four times. Samples will be analyzed for FC bacteria application using the membrane filtration technique and the QuantiTray chromogenic substrate method for total coliform (TC) and E. coli determination (incubated at 35°C).